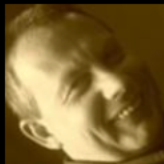


Simplifying HPC – Just push the button

Easy HPC with IBM Spectrum LSF Suites



Bill.McMillan@uk.ibm.com
Principal Product Manager
IBM Spectrum Computing

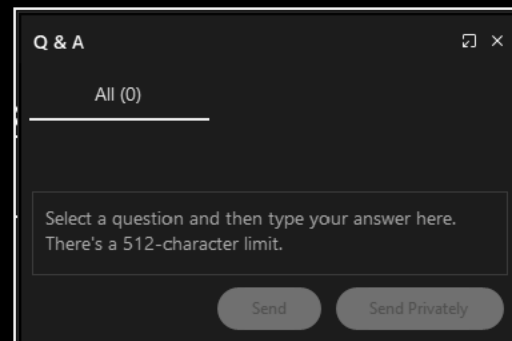
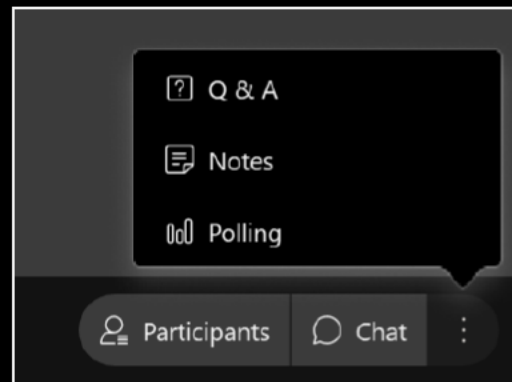


Gábor Samu
Product Manager
IBM Spectrum Computing
gsamu@ca.ibm.com
[@gabor_samu](#)



Q&A

- You can ask questions at any time in the Q&A panel
- Click on the 3 dots to open the Q&A panel
- If we have time at the end, we will take live questions.



Upcoming Public Seminars

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September 2, 2021

What's New in LSF Service Pack 12

Speaker: LSF Support Team

September 16, 2021

Best Practices for Upgrading your LSF Clusters

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November 11, 2021

Expediting PMR's with the LSF Support Tools

Speaker: LSF Support Team

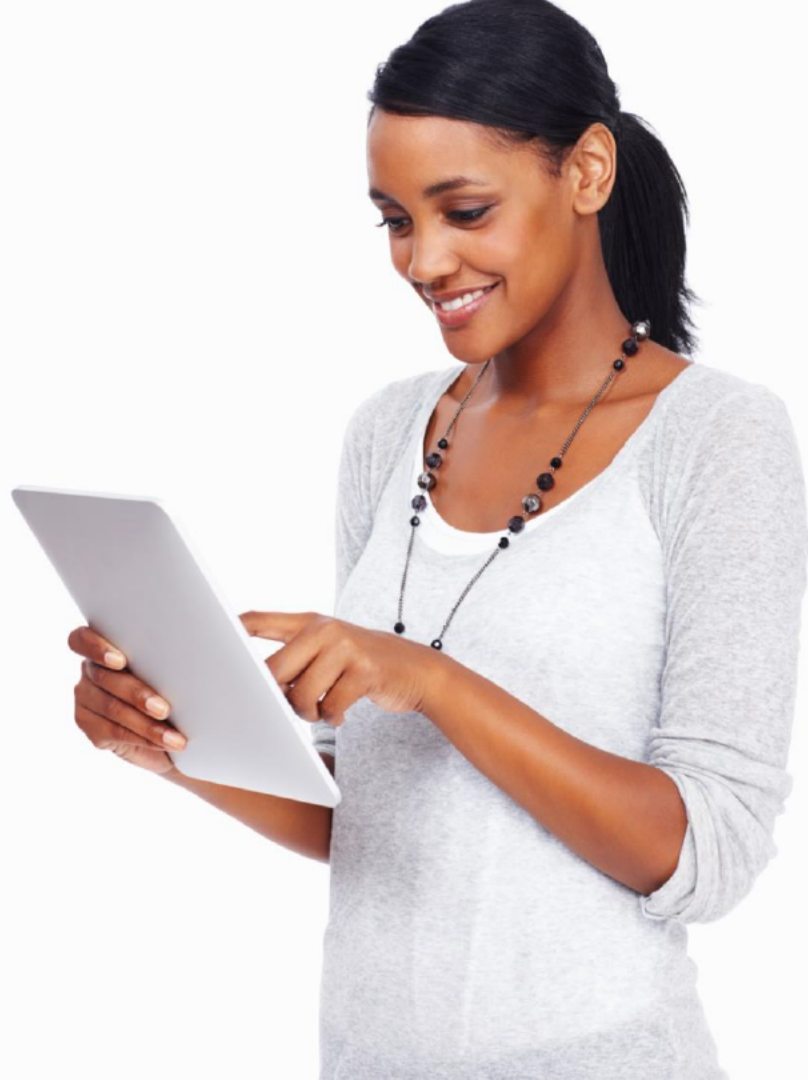
November 29, 2021

**High Performance Computing - Health Check
Services from Lab Services**

In the
beginning...



The times
are a
changin'



We've
come a
long way
in the last
30 years...



Simplified user experience

Spectrum LSF hides the complexity of HPC

Enables users to focus on their work

Reduce onboarding time and errors/failed jobs

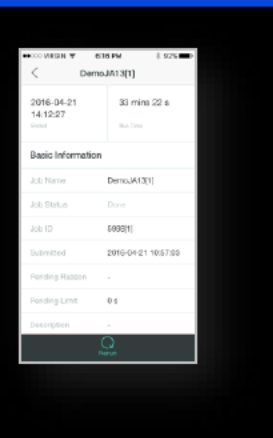
Provides standardized repeatable methods for running jobs

- Simplified web-based interface for job submission, monitoring and visualization
- Customizable submission templates
- Configurable role based access control (RBAC)
- Graphical workflow designer
- Support for remote visualization
- 2D and 3D plotting of job output

The screenshot displays the Spectrum LSF Application Center 16.2 web interface. The top navigation bar includes links for Workload, Resources, System & Settings, and Car Racing. The main content area is divided into several panels:

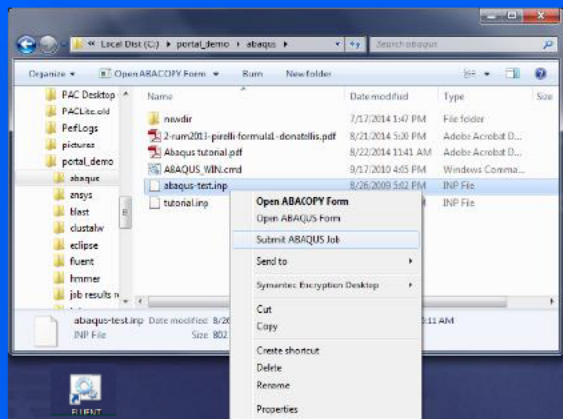
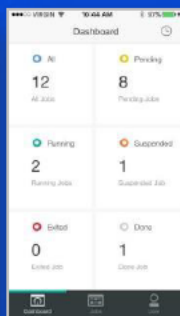
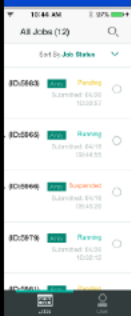
- Workload Panel:** A table listing jobs with columns for ID, Name, Type, State, Submitted, and Start. Jobs are color-coded by state: Running (green), Done (blue), and Failed (red).
- Job Details Panel:** A sidebar for job ABA1011 (688) showing a summary, location, and a list of files with their sizes and modification dates.
- Job Dependencies Panel:** A graph showing the dependencies between different jobs in the workflow.
- 3D Plot Panel:** A 3D surface plot showing the results of a job, with axes for Time in seconds, Epsilon, and Type. A color bar on the right indicates the magnitude of the results, ranging from 0.2 to 1.0.

More ways than ever to be productive



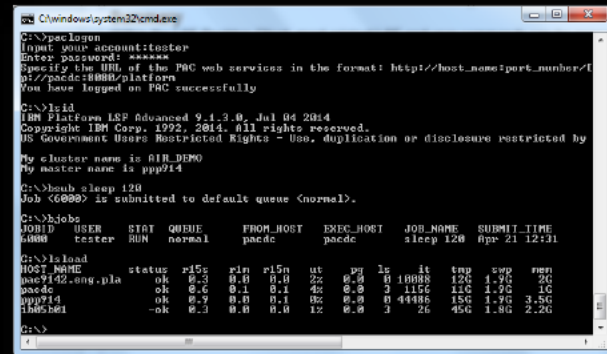
Mobile Clients

- Android & iOS
- Job monitoring
- Job control
- Notifications



Windows Desktop Client

- Job
- Submission via forms, right click, drag & drop
- Control & notifications
- Automated data upload & download



RESTful API & CLI

- Well defined API to build and extend your own HPC tools
- Firewall & network friendly over https

HPC hybrid cloud

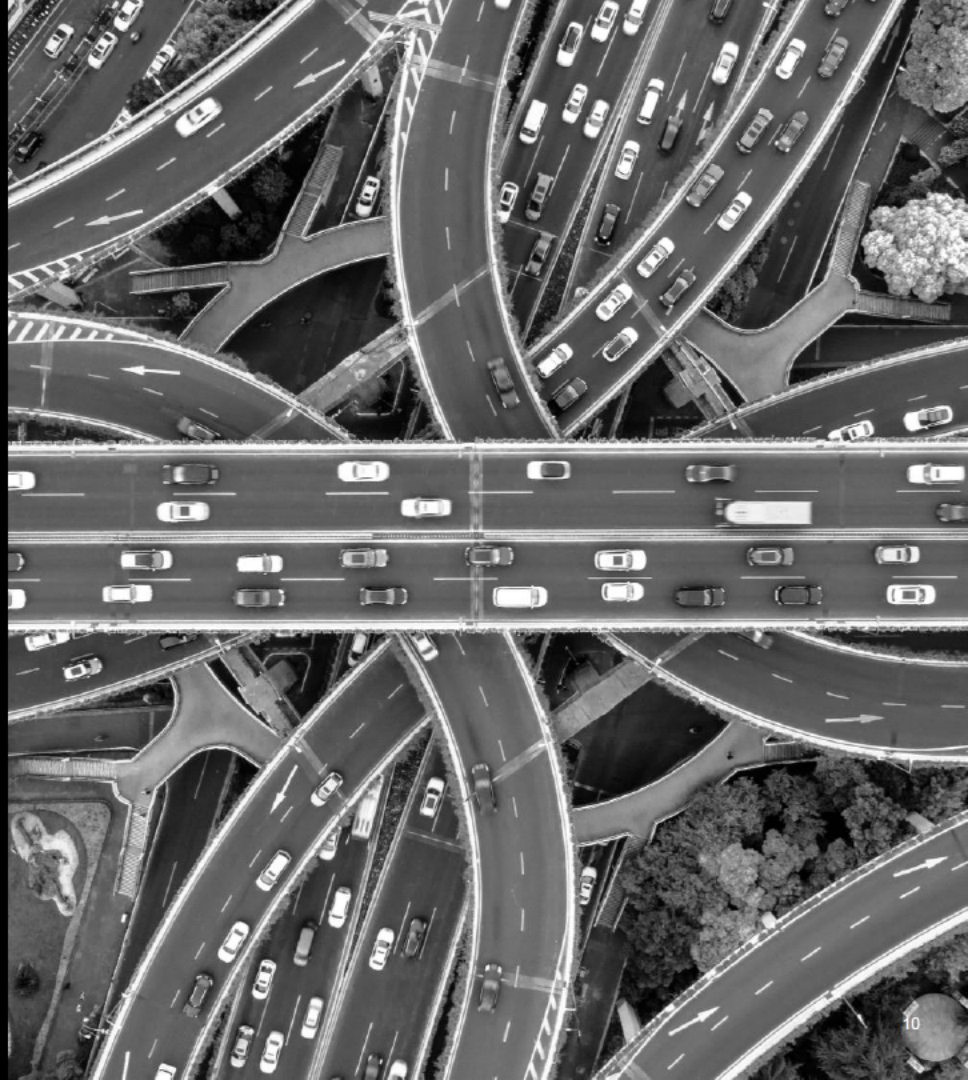
Spectrum LSF makes HPC hybrid cloud simple

- Intelligent, policy-driven flexing of cloud resources based on workload demands
- Only use the cloud resources you need
- Intelligent movement of data for cloud workloads
- Support a number of cloud providers including: IBM Cloud, Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), Kubernetes, OpenShift and OpenStack
- Support for containerized workloads: Docker, Shifter, Singularity, enroot

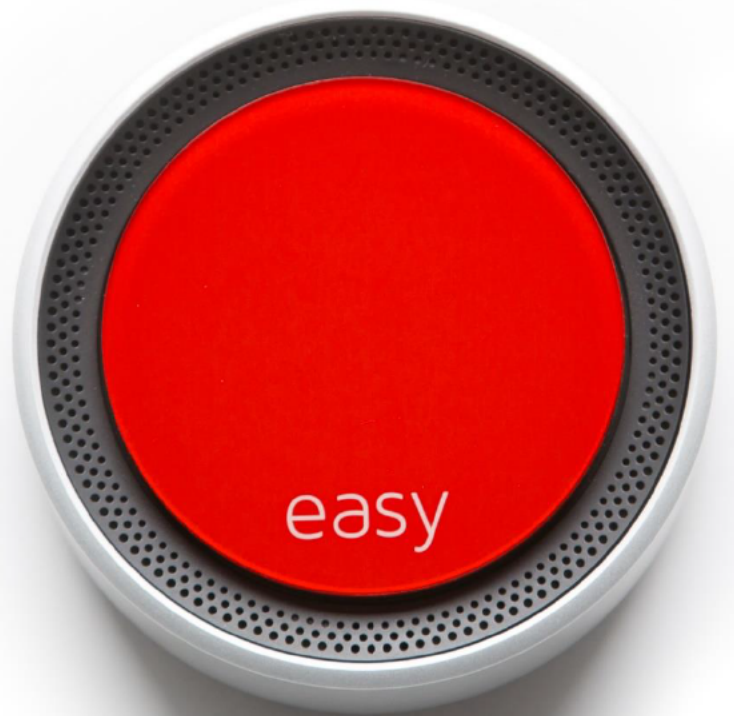


Intelligent data management

- Managed movement of data within and between LSF clusters, with control over policies and priority
- Prevent wasted compute cycles with out-of-band movement of data
- Eliminate redundant transfers with intelligent caching of data
- Factor in data availability in scheduling decisions with multiple LSF clusters
- Configurable file transfer mechanism



Just push
the button



Lost productivity

How much productivity and waste of resources occurs due to user error?

There can be many reasons for HPC jobs failing ...

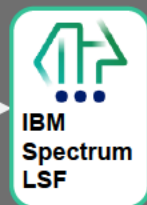
- Barney copied the job script from Fred and made a change and now it doesn't work quite right and randomly dies 5 minutes before completion
- Wilma copied it from Barney and made some other changes
- Now the Fred and Wilma's jobs give different answers for the same inputs
- And what about Betty?



Hybrid Cloud

On Premises

Submit & monitor via web portal, CLI and RESTful API



Workload forwarded to cloud based on policy



Cloud resources can be autoscaled based upon workload demands and policies.

IBM Cloud

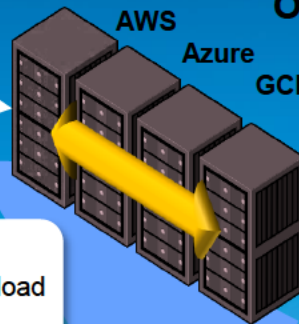
AWS

Azure

GCP

OpenShift/K8s

OpenStack



Data automatically staged on cloud before hosts are provisioned and results returned after completion. Also caches data to avoid repeatedly moving the same files



Off Premises / Cloud



IBM Spectrum LSF Suite for Enterprise 10.2.0.11

☐ Keep me logged in

Behind the curtain



A closer look

```
Job <117579>, Job Name <myOpenFoam_run_motorBike>, User <lsfadmin>, Project <default>, Application <openfoam>, Command </home/lsfadmin/lsfadmin/myOpenFoam_run_1633473613821y6wly/motorBike/bsub.myOpenFoam_run>
Tue Oct 5 18:40:14: Submitted from host <spectrum05>, to Queue <openfoam>, CWD <$HOME/lsfadmin/myOpenFoam_run_1633473613821y6wly/motorBike>, Specified CWD <$HOME/lsfadmin/myOpenFoam_run_1633473613821y6wly/motorBike>, Output File </home/lsfadmin/lsfadmin/myOpenFoam_run_1633473613821y6wly/motorBike/output.lsfadmin.txt>, Error File </home/lsfadmin/lsfadmin/myOpenFoam_run_1633473613821y6wly/motorBike/error.lsfadmin.txt>, Notify when job begins/ends, 4 Task(s), Requested Resources <span[hosts=1]>, Pre-execution Command </mnt/data/scripts/preexec.sh>, Post-execution Command </mnt/data/scripts/postexec.sh>, Data Requirement Requested;
Tue Oct 5 18:40:14: Reporting data requirement to the data manager daemon;
Tue Oct 5 18:40:19: The staging instance <2> is ready;
Tue Oct 5 18:40:20: Forwarded job to cluster HPCCluster;
Tue Oct 5 18:40:20: Job 117579 forwarded to cluster HPCCluster as remote job 2960;
Tue Oct 5 18:40:45: The pre-exec command is started on 4 Task(s) on Host(s) <4*icgen2host-10-244-128-50@HPCCluster>, Allocated 4 Slot(s) on Host(s) <4*icgen2host-10-244-128-50@HPCCluster>, Effective RES_REQ <select[(defined(docker)) && (type == any)] order[r15s:pg] span[hosts=1] >;
Tue Oct 5 18:40:46: Starting (Pid 10851);
Tue Oct 5 18:40:46: Running with execution home </home/lsfadmin>, Execution CWD </tmp>, Execution Pid <10851>;
Tue Oct 5 18:40:46: The batch job command is started on 4 Task(s) on Host(s) <4*icgen2host-10-244-128-50@HPCCluster>, Allocated 4 Slot(s) on Host(s) <4*icgen2host-10-244-128-50@HPCCluster>, Effective RES_REQ <select[(defined(docker)) && (type == any)] order[r15s:pg] span[hosts=1] >;
Tue Oct 5 18:48:13: Done successfully. The CPU time used is 1940.7 seconds;
Tue Oct 5 18:48:13: The staging instance <2> is done;
```

Job is submitted

Report job data requirement

Job forwarded to cloud
Data staged to cloud

Resource connector triggers
creation of new cloud host

Job pre-exec copies data to
execution host from cache

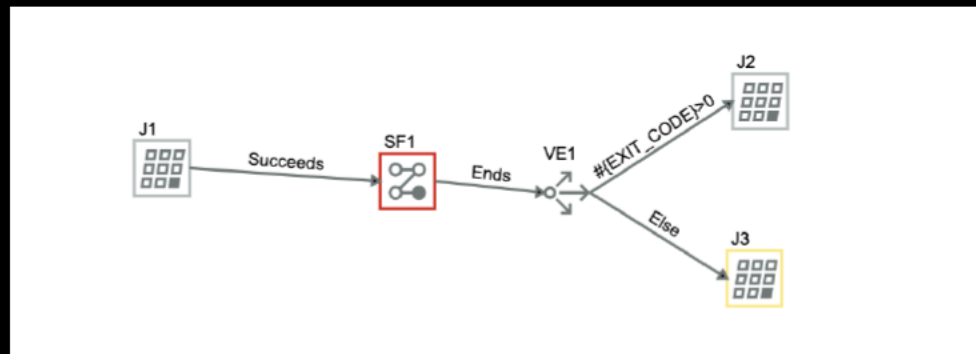
Job starts, downloads
OpenFOAM container
and runs

Job complete, *resource
connector* releases resources
and destroys host if no longer
required

Data staged out

Managing workflows

- Design, document and run complex computational workflows
- GUI driven workflow designer, easily design workflow steps and dependencies between jobs
- Visually track the progress of workflows, easily identify error conditions
- Ability to restart workflow from last failure point



The image shows a workflow diagram on the left, identical to the one above, and a 'Runtime Attributes' panel on the right. The panel displays various attributes for the workflow, including job name, ID, submitter, command, state, exit code, CPU usage, start time, and finish time. Below this, it shows 'Variable Information' for the job, including local variables like `EXIT_CODE`.

Name	Value
Job name	J2
Job ID	473
Submitter	kchik
Command	sleep 10
State	Done
Exit code	0
CPU usage	0.0306 seconds
Start time	Thu Aug 08 13:01:24 GMT-04:00 2019
Finish time	Thu Aug 08 13:01:34 GMT-04:00 2019

Variable Information:
Job ID 473:
Local Variables

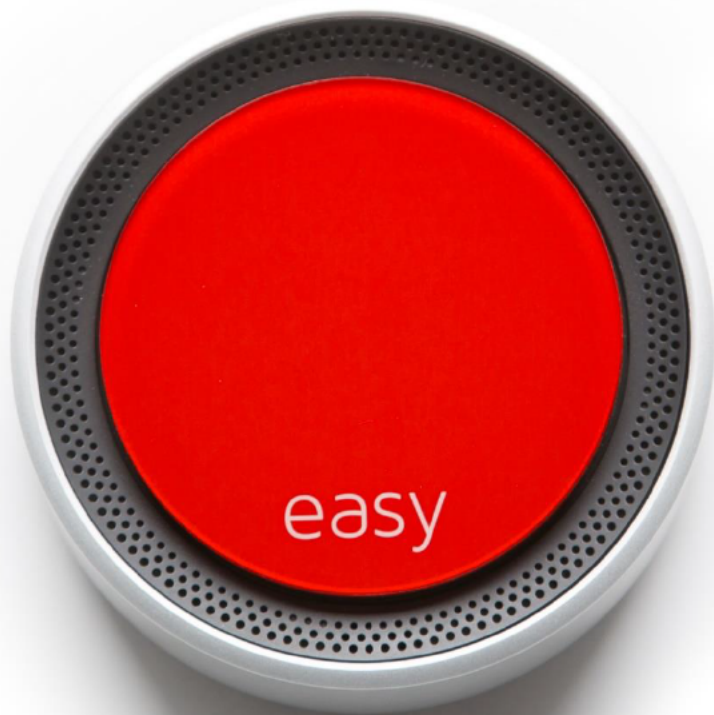
Name	Value
EXIT_CODE	1

Conclusions

Your HPC users don't need to

- Worry about the workflow
- Worry about how to use containers and the complex container command lines
- Worry about how to spin up and tear down cloud resources
- Worry about moving data

They just need to push the button!



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